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Surface Discharge Non-thermal Plasma Reactor and Method

ABSTRACT OF THE DISCLOSURE

A surface discharge non-thermal plasma reactor includes a plurality of surface discharge reactor elements arranged in a stack and having a surface discharge gap formed between adjacent pairs of elements. Individual surface discharge elements include a dielectric substrate having disposed thereon first and second polarity surface discharge electrodes. Surface discharge electrode patterns and substrate configurations are provided to selectively control the volume of nitric oxide (NO) produced from a nitrogen-containing gas stream being treated in the reactor. In a preferred embodiment, surface discharge electrode and dielectric substrate configurations are arranged to maximize the production of NO. The surface discharge electrodes and substrates are combined and connected to a power supply to form various embodiments such as reactor stacks having a plurality of positive surface discharge gaps, reactor stacks having a plurality of negative surface discharge gaps, and reactor stacks having a plurality of alternating positive and negative surface discharge gaps.